CLAIMS

WHAT IS CLAIMED:

1. A method, comprising:

performing a tuning process for an ion implant tool, said tuning process resulting in at least one tool parameter for said ion implant tool;

selecting a fault detection model for an ion implant process to be performed in said ion implant tool based upon said at least one tool parameter resulting from said tuning process; and

monitoring an ion implant process performed in said ion implant tool using said selected fault detection model.

2. The method of claim 1, wherein said tuning process is performed in said ion implant tool.

3. The method of claim 1, wherein said tuning process is performed when a new ion implant recipe is to be performed in said ion implant tool.

4. The method of claim 1, wherein said tuning process results in a plurality of tool parameters for said ion implant tool.

5. The method of claim 1, wherein said selected fault detection model is selected from a plurality of pre-existing fault detection models.

6. The method of claim 1, wherein said selected fault detection model is selected from a plurality of fault detection models based upon a comparison of said at least one tool parameter resulting from said tuning process and a corresponding tool parameter in one of said plurality of fault detection models.

7. The method of claim 1, wherein said at least one tool parameter is comprised of at least one of an implant dose, an implant energy level, a beam current, a twist angle, an arc current, an arc voltage, a filament current, a filament voltage, a gas flow rate, a magnet current, an extraction current, an extraction voltage, a suppression current and a suppression voltage.

8. The method of claim 1, further comprising:

monitoring at least one tool parameter during said ion implant process; and

declaring a fault condition when said monitored at least one tool parameter does not fall within preselected allowable limits established by said selected fault detection model.

9. A method, comprising:

performing a tuning process for an ion implant tool, said tuning process resulting in at least one tool parameter for said ion implant tool;

creating a fault detection model for an ion implant process to be performed in said ion implant tool based upon said at least one tool parameter resulting from said tuning process; and

monitoring an ion implant process performed in said ion implant tool using said created fault detection model.

10. The method of claim 9, wherein said tuning process is performed in said ion implant tool.

11. The method of claim 9, wherein said tuning process is performed when a new ion implant recipe is to be performed in said ion implant tool.

12. The method of claim 9, wherein said tuning process results in a plurality of tool parameters for said ion implant tool.

13. The method of claim 9, wherein said at least one tool parameter is comprised of at least one of an implant dose, an implant energy level, a beam current, a twist angle, an arc current, an arc voltage, a filament current, a filament voltage, a gas flow rate, a magnet current, an extraction current, an extraction voltage, a suppression current and a suppression voltage.

14. The method of claim 9, further comprising:

monitoring at least one tool parameter during said ion implant process; and

declaring a fault condition when said monitored at least one tool parameter does not fall within preselected allowable limits established by said created fault detection model.

15. A method, comprising:

performing a tuning process for an ion implant tool, said tuning process resulting in at least one tool parameter for said ion implant tool; and

determining if said at least one tool parameter resulting from said tuning process is acceptable based on historical metrology data for implant regions formed in at least one substrate subjected to an ion implant process performed in said ion implant tool.

16. The method of claim 15, further comprising performing an ion implant process in said tool using said at least one tool parameter resulting from said tuning process if said at least one tool parameter is determined to be acceptable.

17. The method of claim 15, further comprising performing another tuning process for said ion implant tool if said at least one tool parameter is determined to be unacceptable.

18. The method of claim 15, wherein said step of determining if said at least one tool parameter is acceptable is based upon a confidence value associated with said at least one tool parameter.

19. The method of claim 15, wherein said step of determining if said at least one tool parameter is acceptable is based upon a comparison of said at least one tool parameter resulting from said tuning process and a corresponding tool parameter associated with said historical metrology data.

20. The method of claim 15, wherein said metrology data comprises at least one of a dopant concentration, a depth of a doped region and a dopant concentration profile.

21. The method of claim 15, wherein said at least one tool parameter is comprised of at least one of an implant dose, an implant energy level, a beam current, a twist angle, an arc current, an arc voltage, a filament current, a filament voltage, a gas flow rate, a magnet current, an extraction current, an extraction voltage, a suppression current and a suppression voltage.

22. The method of claim 15, wherein said tuning process is performed in said ion implant tool.

23. The method of claim 15, wherein said tuning process is performed when a new ion implant recipe is to be performed in said ion implant tool.

24. The method of claim 15, wherein said tuning process results in a plurality of tool parameters for said ion implant tool.

25. The method of claim 15, further comprising, if said at least one tool parameter is determined to be acceptable, selecting a fault detection model for an ion implant process to be performed in said ion implant tool based upon said at least one tool parameter resulting from said tuning process.

26. The method of claim 25, further comprising monitoring an ion implant process performed in said ion implant tool using said selected fault detection model.

27. The method of claim 15, further comprising, if said at least one tool parameter is determined to be acceptable, creating a fault detection model for an ion implant process to

be performed in said ion implant tool based upon said at least one tool parameter resulting from said tuning process.

28. The method of claim 27, further comprising monitoring an ion implant process performed in said ion implant tool using said created fault detection model.

29. The method of claim 15, further comprising determining if said at least one tool parameter resulting from said tuning process is acceptable based upon at least one business rule.

30. A method, comprising:

performing a tuning process for an ion implant tool, said tuning process resulting in at least one tool parameter for said ion implant tool; and

determining if said at least one tool parameter resulting from said tuning process is acceptable based on a comparison of said at least one tool parameter with a collection of tuning setpoint models.

31. The method of claim 30, further comprising performing an ion implant process in said tool using said at least one tool parameter resulting from said tuning process if said at least one tool parameter is determined to be acceptable.

32. The method of claim 30, further comprising performing another tuning process for said ion implant tool if said at least one tool parameter is determined to be unacceptable.

33. The method of claim 30, wherein determining if said at least one parameter resulting from said tuning process is acceptable comprises determining if said at least one tool parameter matches one of a selected group of said collection of tuning setpoint models.

34. The method of claim 30, wherein determining if said at least one parameter resulting from said tuning process is acceptable comprises determining if said at least one tool parameter does not match any of said models in said collection of setpoint models..

35. The method of claim 30, wherein said step of determining if said at least one tool parameter is acceptable is based upon a confidence value associated with a setpoint model from said collection of setpoint models that matches said at least one tool parameter.

36. The method of claim 30, wherein said step of determining if said at least one tool parameter is acceptable further comprises comparing said at least one tool parameter resulting from said tuning process and a corresponding tool parameter associated historical metrology data for implant regions formed in at least one substrate subjected to an ion implant process performed in said ion implant tool.

37. The method of claim 36, wherein said metrology data comprises at least one of a dopant concentration, a depth of a doped region and a dopant concentration profile.

38. The method of claim 30, wherein said at least one tool parameter is comprised of at least one of an implant dose, an implant energy level, a beam current, a twist angle, an arc current, an arc voltage, a filament current, a filament voltage, a gas flow rate, a magnet

current, an extraction current, an extraction voltage, a suppression current and a suppression voltage.

39. The method of claim 30, wherein said tuning process is performed in said ion implant tool.

40. The method of claim 30, wherein said tuning process is performed when a new ion implant recipe is to be performed in said ion implant tool.

41. The method of claim 30, wherein said tuning process results in a plurality of tool parameters for said ion implant tool.

42. The method of claim 30, further comprising, if said at least one tool parameter is determined to be acceptable, selecting a fault detection model for an ion implant process to be performed in said ion implant tool based upon said at least one tool parameter resulting from said tuning process.

43. The method of claim 42, further comprising monitoring an ion implant process performed in said ion implant tool using said selected fault detection model.

44. The method of claim 30, further comprising, if said at least one tool parameter is determined to be acceptable, creating a fault detection model for an ion implant process to be performed in said ion implant tool based upon said at least one tool parameter resulting from said tuning process.

45. The method of claim 44, further comprising monitoring an ion implant process performed in said ion implant tool using said created fault detection model.